From The Prez

Toby, WT8O

Holiday Party

The annual CARS holiday party in December turned out to be a roaring success. All the feedback heard from the attendees was extremely positive. The Brew Garden party room had to be one of the best venues we have ever had. The room itself was spacious, yet comfortably cozy. Unlike other restaurant party facilities, we were able to select anything off the regular menu and not limited to a buffet or only a few different dinner selections. CARS also provided appetizers and desert.

The big award was the coveted “Ham of the Year” plaque given to a very deserving John, NU8Y. The “Rookie of the Year" plaque honored Al, KF8BCC. The net controllers all received personalized tumblers, those with 45 or more check-ins were rewarded with individualized ceramic mugs, and Bob, KC8MRC, got a very nice wood and glass award for the most net check-ins for four years running.

Bob also won the big dollar 50/50 for the first time. A drawing was also held with the free ticket each guest was given and many folks won gift cards and other miscellaneous prizes they were able to choose from.

We can’t say enough good things about the Brew Garden staff who hustled taking our orders and serving us our dinners. They were super friendly and courteous probably losing a pound or two while we put on a couple.

If you missed this year’s party, plan on coming next year and check out the pictures down the page and see what you missed.

. Seven Hills Christmas Parade

Joe, KD8BAL; Matt, KE8OZU, and I braved a cold Saturday morning in early December to assist with the Seven Hills Christmas Parade. Cool it was, but there was no snow falling or harsh winds blowing. As can be seen from the pictures, the participants in the parade were the true heroes. Many needed to stay in costume unable to don heavy coats, hats or gloves.

The CARS crew arrived before anyone. As soon as the numbered flags were delivered, we began pounding them into the frozen ground designating the spots where each group would line up. When the participants arrived, we guided them to their locations. All went smoothly and the parade began without a hitch.

Not only do we live up to the CARS motto “Hams who serve,” but the city of Seven Hills rewards us by providing us with a venue for amateur radio licensing and Morse Code classes.

2025 Licensing Classes

Once again, CARS will provide amateur radio licensing classes beginning in February. We will offer classes for Technician, General, and Amateur Extra levels. The exact dates are now being finalized and will be announced in the February *WO*, on the CARS website, and during the weekly Wednesday nets.

Many thanks to our dedicated and experienced staff consisting of David, KD8ACO; Ron, K8RJH; Joel, K8SHB, and myself who will be organizing and instructing the classes.

Welcome New *Wobbly Oscillator* Staff

The improvement you see in this edition of the newsletter can be attributed to the new editor – Perry, KB8AYQ and assistant editor Yuri, W4YSW. Perry’s many years of experience in the publishing industry teamed up with Yuri’s abilities promise to upgrade our club news sheet to be something we can all be proud of.

No one can be happier than I to be relieved of the editorship after several years of hacking away in an effort to keep the functionality of the *WO* alive. I sincerely thank you guys and wish you great success.

Next CARS Meeting

Tuesday, Jan. 14 - 7:30 PM

Busch Community Room 7501 Ridge Rd. - Parma

Lynee Bixler

Will present a program on:

Cuyahoga Valley Scenic Railroad

Connecting the dots. . . and dashes

We're all Elmer's. There is a lot of knowledge among CARS members, new and old, newly licensed and old hands. Elmer is the term applied to an experienced ham who helps a new ham develop their skills and knowledge (and solve problems). That implies a one-way learning/sharing process, and that's not how it really works. At meetings, there is a lot of sharing on every facet of ham radio and related subjects. We all have an opportunity to learn something from the person sitting across from us. This newsletter helps to facilitate that exchange through articles and discussions provided by members. If there's something you want to know or know more about, just ask. Someone in the club will have the answer or help find it.

November 2024 Meeting Minutes

LOCATION - The meeting was held on November 12th at the Busch Funeral Home on Ridge Road in Parma, Ohio.

CALLED TO ORDER - President Toby Kolman, WT8O, called the meeting to order at 7:30 PM.

PLEDGE OF ALLEGIANCE - Those present pledged allegiance to the flag of the United States of America.

INTRODUCTIONS - Those present introduced themselves. The meeting had 22 attendees.

MEETING MINUTES - The October minutes, as published in the October issue of the *Wobbly Oscillator* (*WO*), were approved.

TREASURER'S REPORT - Toby Kolman, WT8O, gave an update on behalf of Matt Perlman, KE8OZU. No concerns were reported with the financials.

PRESIDENT'S REPORT - Toby Kolman, WT8O, reported the following:

Elections for officers and open board members were held:

- Called for nominations for the election; no additional nominations were presented.
- Previous nominations included keeping the current list of officers, and the following members were nominated for the three board positions that are up for election:
  - Eddie, KD8FTS;
  - Mark, KC8ESG; and
  - Al, KF8BCC.
- A motion was presented to close the election and elect the current nominees, and it was passed to elect the nominated candidates.

- The holiday party date and location of Friday, December 13th, at the Brew Garden on Bagley Road were announced. Members were asked to notify Toby if they planned to attend.
- Members were asked to, please let Toby know, if they had ideas for activities during the Holiday Party.
- The following weekend of November 16-17th, was the November Sweeps contest. Toby and others shared the rules and tips for the contest.
- Meeting attendees voted to admit new member Derik Poindexter (who is waiting on his callsign). His membership was approved.
- Update on Ron
- Help with pictures; please take photographs of the meeting and email them to Toby.
- Please verify the accuracy of the roster on the website. Please let the webmaster or Matt, NU8H, know if you have any changes.
- Reminder about parking at Busch: please save spots near the building for folks who need them.

VP REPORT - On behalf of Ron, K8RJH, Matt, NU8H, reminded folks to pay their ARRL dues through the club.

SECRETARY'S REPORT - Secretary Matt Neely, NU8H: No updates.

PUBLIC SERVICE - Chuck, K8CVM, shared that all CARS members are invited to the local ARES meetings. The meetings are held on the third Tuesday of the month, typically at the Helwig Whistle Stop. No meetings or nets will be held until January. Check the website for the location of the next meeting; it may not be at Helwig Whistle Stop. Visit https://n8esg.org/ for details and to volunteer. Chuck shared updates:

- Reminded members of various ARRL membership discounts
- Limburg Special Event station commemorated the retirement of the F-16 from the Royal Netherlands Air Force (RNLAF). Members of Radio Club Limburg activated the callsign PF16F from 1 to 30 November 2024.

VE UPDATE - Metro, W8MET, shared that the next session is January 12th at 9:15 AM at the Old Elmwood Recreation Center, 6200 Pete Wisniesky, Independence 44131. We have three new VEs: Simpson, N8UZF, David, AC8TN, and Matt, NU8H.

PROGRAM COMMITTEE - Joe, KD8BAL, reported that:

- At the current meeting, Ted Alexander W8IXY would speak about his experience in commercial and amateur radio.

TECH COMMITTEE - Toby, WT8O, shared that work is still underway to restore the EchoLink and AllStar connections to the repeater.

OLD BUSINESS - Toby, WT8O, led a discussion on the following:

- Seven Hills Christmas Parade, Saturday, December 7th. We have enough volunteers but can always use more help. If you are interested, contact Toby.
- We need volunteers for the committee for the Holiday Party and Summer Picnic.
- Donated equipment: We still have equipment. We'll take any reasonable offer for the tuner and Heathkit 6M AM transmitter.

NEW BUSINESS - Toby, WT8O, led a discussion on the following:

- Yuri, W4YSW, recommended CARS set up a Discord channel. After some discussion, the club voted and supported this idea.
- If you have suggestions for mentoring sessions, please send them to Toby.

REFRESHMENT - Thank you to Al, KF8BCC; Matt, NU8H; John, NU8Y.

NEXT MEETING - The Cuyahoga Amateur Radio Society's next meeting will be on January 14th at the Busch Funeral Home on Ridge Road in Parma, Ohio.

ADJOURNMENT - Toby, WT8O, adjourned the meeting.

50/50 Drawing - Matt, NU8H, won the 50/50 drawing and donated his winnings back to the club.

Submitted by Matt Neely, NU8H, CARS Secretary

Discord Server Now For CARS Members

CARS is happy to introduce a new resource: the CARS Discord server.

It's a place where we can chat in real-time, exchange ideas and experiences, ask questions, learn new stuff from other hams, and more.

Also, it has a marketplace where you can sell or trade your gear. We all hope that this server will serve (pun intended) all of us by giving us additional communication options.

Discord: is free software that can be installed on your computer and/or smartphone (you can have it on a few devices simultaneously; all messages will be synced). After clicking the join link, you are transferred to the Discord website where you can log in (if you already have a Discord account) or create a free account. When you join the CARS chat, on the left side, you will see different chat rooms dedicated to different topics. The chat rooms will be constantly updated, and new chat rooms and options will be added for your convenience.

At this time, the CARS Discord server is for club members only. If it becomes popular and active, the CARS administration may consider opening it to the public, so ham operators who are not CARS members will also be able to join. The link to join will be placed in the members area of our club website. Please, DO NOT FORWARD it to people who are not CARS club members.

If you have any questions or ideas on how we can improve this service, please feel free to DM Yuri W4YSW or @mods in the chat. You can also email us.

We hope you will enjoy and benefit from this new opportunity.

January Net Sked

JAN	1	AC8NW
JAN	8	AC8TN
JAN	15	WT8O
JAN	22	K8RJH
JAN	29	KD8ACO

Nets are run every Wednesday at 9:00 PM on:

146.820 (PL 110.9)

443.825(+) PL Tone 131.8
Digital Yaesu Fusion / C4FM
Linked to the 146.82 Repeater

EchoLink Node 343470 (K8ZFR-R)

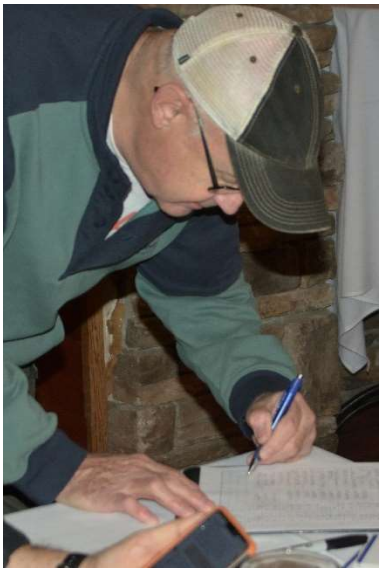
Allstar Node 47067

WIRES X Node 91242-Room 01242

NOTE: Anyone interested in operating as Net Control, please contact Toby, WT8O

December Holiday Party

The 2024 CARS Holiday Party was held December 13th at the Brew Garden in Middleburgh Heights. The event was well attended, and everyone brought their holiday spirit. There were plenty of door prizes, a 50:50 drawing, and a number of year-end awards acknowledging members' service to CARS and to ham radio as well as their achievements.



Special Recognition and Achievements

Ham of the Year, John NU8Y

Rookie of the Year -Al, KF8BCC

Net Check-In – Bob, KC8MRC

Mark, WJ8WM presents Net Check-In award to Toby, WT8O

Other awards and recognition were presented to Net Control Operators and other members, recognizing their contributions to CARS and the amateur radio hobby.

To Tune or Not to Tune?

David, AC8TN

Wonder why the other guy makes the contact and no one seems to hear you? Working on your WAS or DXCC award and frustrated because another one got away? Or simply can't seem to have a QSO with anyone.

The problem may be your poorly performing non-resonant antenna.

Operating with a resonant antenna (SWR= 1.0:1) means that the 100 watts out of your radio will essentially all be radiated from your antenna. This is an ideal antenna that we all desire. With a 2:1 SWR your 100W watt radio's effective radiate power is only about 89 watts.

ANTENNA SWR	RADIO WATTS	EFFECTIVE RADIATED (W) POWER	POWER LOST (W)
1:1	100	100	0
1.5:1	100	96	4
2:1	100	89	11
2.5:1	100	82	18
3:1	100	75	25
4:1	100	64	36
5:1	100	56	44
6:1	100	49	51
7:1	100	44	56
8:1	100	40	60
9:1	100	36	64
10:1	100	33	67

Figure 1: SWR Loss Table

What happened to the missing 11 watts of power? The eleven watts will be reflected down your coax back towards the radio. This reflected power is lost from your radiated signal and is dissipated as heat in your coax and your radio. Too much heat means damage to your coax and also to your radio. It is NOT recommended to operate with greater than a 2:1 SWR.

If you have a 2:1 SWR what can you do?

You have some options. You can begin by changing the length of the antenna. It can also be relocated away from obstructions, or it can be sloped or taken down to try something else. After exhausting all of your options to make it resonate on your preferred band(s), you can choose to do nothing to the antenna and simply use a tuner.

ANTENNA SWR	RADIO WATTS	EFFECTIVE RADIATED (W) POWER (%)	POWER LOST (W)
1:1	1500	100	0
1.5:1	1500	96	60
2:1	1500	89	165
2.5:1	1500	82	270
3:1	1500	75	375
4:1	1500	64	540
5:1	1500	56	660
6:1	1500	49	765
7:1	1500	44	840
8:1	1500	40	900
9:1	1500	36	960
10:1	1500	33	1005

Figure 2: At Legal Limit SWR Loss Table

A tuner allows you to use an antenna with >2:1 SWR without damaging your radio. The tuner fools your radio into "thinking" that it has a resonant antenna attached. The tuner does not fix the poor antenna. The antenna is still non-resonant and an inefficient performer.

Let's explore how much of your radio's power is wasted as the SWR climbs. (See Figure 1 for your power lost levels as SWR increases.)

At 3:1 you lose 25% of your radio's power as heat. At 5:1 SWR 44% of your power is lost and at an SWR of 10:1, 67% of your radio's power is wasted as heat. Most modern radios have built in tuners to handle SWR levels as high as 3:1. Usually external tuners are required for SWR levels from 3:1 to 10:1. These tuners can keep your radio safe by matching the antenna's impedance to the radio, but cannot improve that compromised antenna performance.

When the SWR is sufficiently high that the tuner can no longer fool the radio, then the radio may "fold-back" its power for self-protection. Remember, high reflected power, that power coming back down the coax, can damage or destroy your radio.

If you have an amplifier, the potential for equipment failure is even greater with non-resonant antennas. Running legal limit into a 2:1 SWR antenna yields 165 watts of reflected (wasted) power that will heat things up quickly. (See Figure 2 for power lost levels running legal limit and elevated SWR levels.)

Most modern solid state amplifiers will fault (shut down) with SWR levels > 2:1. Expensive external tuners can be used with amplifiers (see Figure 3) and non-resonant antennas, but remember that all that reflected power from the amp has to go somewhere and it's not making you any louder on the air.

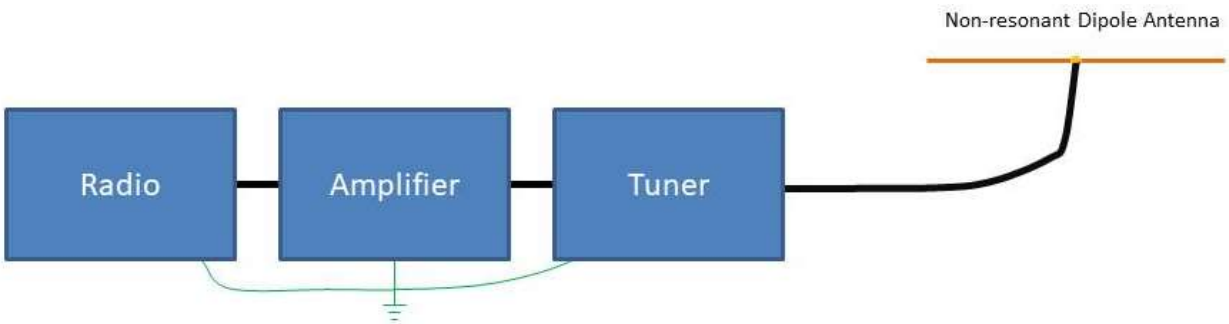


Figure 3: Amplifier with External Tuner

Bottom line a non-resonant antenna can be used with a tuner, but there is always a penalty… reflected power is wasted power (in the form of heat). That heat can damage your station.

If a resonant antenna is simply impossible, then aim for antennas with a 3:1 SWR or less and use a tuner. That way you're effectively transmitting 75% or more of your radio's rated power. As the SWR goes up, the tuner will keep your radio safe, but you'll probably be making fewer and fewer contacts.

My recommendation is to always strive to use resonant antennas.

73, Dave, AC8TN

Dues Notice
Matt, KE8DZV

Your 2025 CARS dues are payable on or before January 31, 2024. If you have already paid THANK YOU.

Dues can be paid in two ways:

You can mail a check to:

CARS
PO Box 31264
Independence, OH 44131-0264

Pay in person at any CARS meeting.

Dues are $26.00 per year for regular membership. Each additional family member is $16.00. If you are 60 yrs. or older, your dues are only $18.00 per year.

CARS will offer assistance to anyone having a hardship.

Please let me know if you have a hardship or know a member who needs help..

ARRL Member?

Are you also a member of ARRL?
CARS is an ARRL affiliated club and receives a commission when CARS members join or renew their ARRL membership through CARS. In order for CARS to receive the commission, please follow this process. Contact the CARS Treasurer with any questions.

Fill out a paper ARRL membership application or the ARRL renewal form you received.

Provide the following items to the CARS Treasurer. The items can be mailed to PO Box 31264, Independence, OH 44131 or given to the Treasurer in person at any CARS meeting.

- Your completed ARRL membership application
- A check made out to ARRL for the full amount due on the application
- A stamped envelope addressed to ARRL. The ARRL address is on the membership application. Please do not seal the envelope.

NOTE: Please do not include CARS dues in the ARRL membership/renewal amount, you will need to pay your CARS dues separately, as described above.

Wires-X. . . Quickly, What is it?

John, N8VY

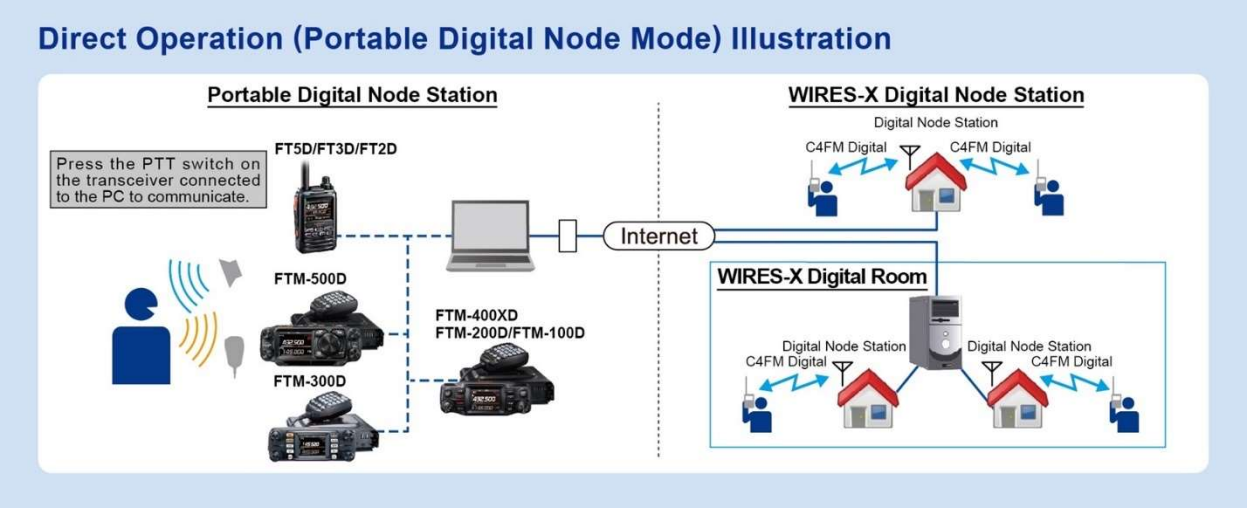
A quick Google search of “What is WIRES-X in ham radio” yields many confusing results including the following:

“WIRES (Wide-coverage Internet Repeater Enhancement System) is an Internet communication system which expands the range of amateur radio communication. For WIRES-X an amateur node station connecting to the Internet is used as the access point and connects the wireless communication to the Internet”

A lot of people have probably read this description and said, “forget that.” So I will try to, as quickly and as simply as possible, tell you what I think WIRES-X is all about. . . in just one sentence.

WIRES is a system whereby you can connect your Yaesu digital radio to your computer with a special cable and talk to other hams using WIRES, all over the world. That's it.

Now for a few more of the details. The cable cost is about $25 and the software is free to download once you are registered with Yaesu. All licensed hams can participate. No other expenses are involved. You can use a mobile or handheld (HT) radio. The digital audio signal is crystal clear. And, to top it off, no antenna is required.



You can operate as a “node” (individual) or with a $124 Yaesu device and some additional cables, you can create your own “room” where multiple people can linger and wait for something to talk about. There are a number of ways this can be set up, including some analog methods.

The software displays thousands of nodes and rooms from around the world by call sign. They can be sorted in many ways. There are nets and chat groups similar to traditional ham radio. CARS has a WIRES room and numerous people outside the repeater area regularly use it to check into our weekly net. I often just connect to a room in some remote part of the world and just transmit “NU8Y John in Ohio, USA and I am listening.” Someone is usually ready to talk. It is just that easy.

That is about as simple as I can make it. If enough members are interested, a WIRES demonstration and discussion could be arranged at one of the CARS monthly meetings

Enhance Your Amateur Radio Service in 2025

Ron, K8RJH

Throughout the history of Amateur radio, “Hams” have contributed a vital role in public service by providing essential communication support through numerous emergencies and community events.

In the Cleveland and North Eastern Ohio area, opportunities are scheduled to learn and participate with many volunteer events in 2025, that would make a perfect resolution for any amateur to improve their operating skills and participate in key community events. One’s participation is very worthwhile in learning operating techniques and meeting other amateurs in the local area. Here are four key areas of involvement that may be of interest:

Disaster Response: Amateur Radio Emergency Service (ARES) volunteers assist during natural disasters by establishing communication when other systems fail. They help coordinate relief efforts and provide critical information to emergency services. Information on local ARES, Event Support Group (N8ESG) and Skywarn can be found at https://N8ESG.org

Community Events: Operators often support local events like marathons, parades, and fairs by managing communications to ensure safety and coordination. Major Events in the Cleveland area for is coordinated through the Event Support Group (N8ESG), link above. Also, several local community events

are coordinated through our CARS Radio Club.

Training and Preparedness: Organizations like the American Radio Relay League (ARRL) offer training and resources to prepare amateur radio operators for public service roles. Check out http://arrl.org/public-service and http://arrl.org/public-service-resources for on-line information and training.

National Traffic System (NTS 2.0): This system handles written messages via various communication modes, ensuring reliable message relay during emergencies. Information may be found at https://nts2.arrl.org/ and is a good review of the communication capabilities using Amateur Radio networking.

This is just a start of what our operating and volunteer skills may offer within our local community. Also, are you considering joining or already part of an amateur radio group specializing with a served agency? Learn more at: https://www.onallbands.com/emcomm-hams-making-a-difference-through-public-service/

January VE Session

The next VE testing session will be held Sunday, January 12th, at 9:15 AM at the Old Elmwood Recreation Center, 6200 Pete Wisniesky Parkway, Independence 44131. Directions and a map are on the CARS website homepage. For information or an appointment please contact Metro, W8MET, at 216-520-1320 or metro351@sbcglobal.net

We have three new VEs:

- Simpson, N8UZF
- David, AC8TN
- Matt, NU8H

As always, walk-ins are welcome.

No matter what your license class is, or how much time you have available to volunteer, your service would be welcome in a number of ways this year! Just be sure to ask any CARS officer or active public service member in our scheduled Monthly Club meetings for current volunteer information.

CARS
Repeaters

146.820 (-) PL Tone 110.9

Analog Repeater

Main Site – Brecksville

Receive Only Site – Brunswick

Receive Only Site – Shaker Hts.

AllStar Node 47067

EchoLink Node 343470 (K8ZFR-R)

WIRES X Node 91242 Room 01242

****

443.825 (+) PL Tone 131.8

Digital Yaesu Fusion

Linked to 146.820 Repeater Brecksville

****

444.75 (+) PL Tone 131.8

Analog Repeater

Not Linked to Other Repeaters

Honorary Members

Any person who by nature of outstanding or meritorious contribution to the furtherance of amateur radio and the ideals of the Cuyahoga Amateur Radio Society

Robert Check, W8GC
Elected 2/10/15

Thomas Wayne, WB8N
Elected 1/10/17

Dwaine Modock, K8ME/SK
Elected 5/9/17

Toby Kolman, WT8O
Elected 10/10/17

Jerry Smith, NW9H
Elected 5/8/18

Ron Borkey, K8VJG/SK
Elected 5/14/19

Ed Stevens, WB8ROK/SK
Elected 8/10/21

Vince Bak, N8OVW/SK
Elected 11/14/23

2025 CARS Committees, Officers, Board and Trustees

CARS 2025 Committees

50/50

Chair: Andy Evridge, KD8SCV
Member: Joe Ulazewski, KD8BAL

ARRL Liaison

Chair: Ron Hollas, K8RJH

Audio/Video

Chair: Scott Smith, AC8NW

Audit

Chair: Ron Hollas, K8RJH
Members: Eddie Stevens, KD8FTS and Toby Kolman, WT8O

Awards

Co-Chairs: Toby Kolman, WT8O and Mark Moro, WJ8WM

Field Day

Co-Chairs: Bob Robbins, K8RGI and Toby Kolman, WT8O
Members: Scott Smith, AC8NW, David Korow, AC8TN, Arp Viiberg, K8ARP, Ron Hollas, K8RJH, Andy Evridge, KD8SCV and Mark Moro, WJ8WM

Hamvention Bus

Chair: Eddie Stevens, KD8FTS

Historian

Chair: Toby Kolman, WT8O

Holiday Party, Summer Picnic

Chair: Toby Kolman, WT8O and Mark Moro. WJ8WM
Member: Arp Viiberg, K8ARP

License Classes

Chair: David Noeth, KD8ACO
Members: Joel Chaney, K8SHB, Ron Hollas, K8RJH and Toby Kolman, WT8O

Media Representative

Chair: Andy Evridge, KD8SCV

Membership

Chair: Toby Kolman, WT8O
Member: Matt Perlman, KE8OZU

Net

Chair: Toby Kolman, WT8O
Members: Scott Smith, AC8NW, David Korow, AC8TN, Ron Hollas, K8RJHb and David Noeth, KD8ACO

Newsletter

Chair: Perry Trunick, KB8AYQ
Member: Yuri Sivitski, W4YSW

Programs at Meetings

Chair: Joe Ulaszewski, KD8BAL
Members: Eddie Stevens, KD8FTS and Matt Perlman, KE8OZU

Public Service

Chair: Eddie Stevens, KD8FTS
Member: Arp Viiberg, K8ARP

QSL Manager

Chair: Metro Sinko, W8MET

Quartermaster

Chair: Toby Kolman, WT8O

Records Custodian

Chair: Terry Pillatt, KB8DTC

Refreshments - Coffee

Chair: John Dernar, NU8Y

Refreshments - Donuts

Chair: Matt Neely, NU8H

Refreshments - Pop

Chair: Al Farley, KF8BCC

Scholarship

Chair: Toby Kolman, WT8O
Members: Bob Robbins, K8RGI, Ron Hollas, K8RJH, Matt Perlman, KE8OZU, and Mark Moro, WJ8WM

Sunshine (Welfare)

Chair: Andy Evridge, KD8SCV

Technical

Chair: Scott Smith, AC8NW
Members: Mark Scoville, AD8KE, Ron Hollas, K8RJH, Terry Pillatt, KB8DTC, Mark Rosewicz, KC8ESG, David Noeth, KD8ACOb and Mark Moro, WJ8WM

VE Exams

Chair: Metro Sinko, W8MET
Members: Members: George Pindroh, K8KR; Fred Freer, K8IG: David Korow, AC8TN, Simpson Huston, N8UZF, Matt Neely, NU8H

Webmaster/email

Chair: Matt Perlman, KE8OZU

2025 Officers

President

Toby Kolman, WT8O

440-525-6109

wt8o@att.net

Vice-President

Ron Hollas, K8RJH

216-379-7440

ron@hollas.co

Secretary

Matt Neely, NU8H

216-965-4476

matt@matthewneely.com

Alternate Secretary:

Matt Perlman, KE8OZU

Treasurer

Matt Perlman, KE8OZU

216-337-1540

matt@seagem.me

CARS 2024 Executive Board

Board Chair

Mark Moro, WJ8WM
216-496-2871

Alternate: Arp Viiberg, K8ARP

Even Year Board Members

Scott Smith, AC8NW; John Dernar, NU8Y, and Mark Moro, WJ8WM

Odd Year Board Members

Eddie Stevens, KD8FTS; Mark Rosewicz, KC8ESG, and Al Farley, KF8BCC

CARS License Trustees

K8ZFR Trustee
Toby Kolman, WT8O

W8BM Trustee
Mark Moro, WJ8WM

W8HBI Trustee
Matt Perlman, KE8OZU

The *Wobbly Oscillator* is a publication of the Cuyahoga Amateur Radio Society. Articles from this publication may be reprinted in any ham radio publication, if credit is given to this publication and the author, if known. All submissions should be emailed to: Perry A Trunick, KB8AYQ at perry@trunick.com